

Antiviral Activity of Some Indian Medicinal Herbs

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ABSTRACT

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Viral diseases, including emerging and chronic viruses, are an increasing worldwide health concern. As a consequence, the discovery of new antiviral agents from plants has assumed more urgency than in the past. A number of native Indian medicines of plant origin are known to have antimicrobial and anti-inflammatory activity, although only a few have been studied for their antiviral properties and immunomodulating effects. The number of patients seeking alternate and herbal therapy is growing exponentially. Herbal medicines are the synthesis of therapeutic experiences of generations of practicing physicians of indigenous systems of medicine for over hundreds of years. Herbal medicines are now in great demand in the developing world for primary health care not because they are inexpensive but also for better cultural acceptability, better compatibility with the human body and minimal side effects.

This review gives an overview of some important medicinal plants with antiviral activity which are traditionally used in India.

Keywords: Antiviral, Herbal medicine, immunomodulating effects

INTRODUCTION

Plants have been a major source of medicine for human kind. According to available information, a total of at least 35000 plants species are widely used for medicinal purposes. The demand for traditional herbs is increasing very rapidly, mainly because of the harmful effects of synthetic chemical drugs. Indigenous medicine is now recognized worldwide both by the rural populace and the urban elite as an important healthcare resource. The World Health Organization (WHO) has pointed out that traditional medicine is an important contribution to its health goals. There are considerable economic benefits in the development of indigenous medicine and in the use of medicinal plants for the treatment of various diseases (WHO, 2003). India has a rich tradition of herbal medicine as evident from Ayurveda, which could not have flourished for two

thousand years without any scientific basis. Ayurveda which literally means knowledge (Veda) of life (Ayur) had its beginning in Atharvaveda (Circa 1500-1000 BC). Charak Samhita and Sushruta Samhita are the two most famous treatises of Ayurveda. Charak, Sushruta and Vagbhata described 700 herbal drugs with their properties and clinical effects. Based on clinical effects 50 categories of drug have been described – such as appetizers, digestive stimulant, laxatives, anti-diarrhea, anti-haemorrhoid, anti-emetic, anti-pyretic, anti-viral anti-inflammatory, anti-pruritic,

anti-asthmatic, anti-epileptic, anti-helminthic, haemoptietic, haemostatic, analgesis, sedative, promoter of life (Rasyana), promoter of strength, complexion, voice, semen and sperm, breast milk secretion, fracture and wound healing, destroyer of kidney stones etc.¹

Viral diseases, including emerging and chronic viruses, are an increasing worldwide health concern. Due to the global disease burden caused by viral infections there is an urgent need for novel and more effective antiviral drugs. Medicinal herbs and their bioactive constituents came in the center of interest, since they may provide feasible treatment options for the population of developing countries, where the majority of the population cannot afford for expensive chemical drugs of western medicine. Now a days viral infections are becoming a great danger to humans and often cause death. In the past, deadly viruses caused pandemics in the world. Due to the metabolic properties of viruses, they are difficult to control and there are still relatively few drugs for treatment of viral diseases. The major problem encountered in the treatment against viruses is their rapid adaptation and development of drug-resistance as well as the emergence of new hybrid viruses.²

Common medications used against viral infections are often inadequate and show a variety of side effects. In the last few years, natural remedies gain more and more popularity in the field of medical science.³ The idea of herbal drugs is popular because of easy access, cost effectiveness, less side effects and good tolerability.

Viruses are obligate intracellular parasites with a viral genome (DNA or RNA) and protein envelope (capsid).

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Viruses do not have an own metabolism and are not able to replicate by own or to perform biosyntheses. To this end, they exploit and control the host cell. They are transmitted by droplet infection, exchange of body fluids ,contact infection and blood-sucking insects.⁴The viral life cycle can be divided in various sections -

- During adsorption, the virus attaches to the host cell.
- The virus penetrates the cell and releases genetic material during uncoating.
- The genome of the virus exploit the cell and takes control over it.
- The cell begins to synthesize virus particles.
- Then, new viruses are formed, and finally leave the cell.
- The new viruses are now able to infect other cells.

Mechanisms of action of existing antiviral drugs⁵ -

- To prevent viral entry into the cell, adsorption of the virus has to be avoided, e.g. by antibodies or specific ligands.

- Inhibit viral uncoating after endocytosis by Capsid-stabilizing agents and blocking of endosomal ion channels.
- DNA or RNA replication can be suppressed by inhibition of DNA- or RNA-polymerases, by endonucleases, or by nucleoside analogues.
- Virus replication can be interfere with Nucleoside analogs
- Protease inhibitors prevent virus maturation and discharge. These substances are peptides that block protease substrates. This leads to suppression of maturation and interruption of the viral replication cycle.

Antiviral activity of Indian plants

Plants contain a wide variety of phytochemicals, such as alkaloids, phenolic compounds, tannins, saponins, flavonoids, terpenoids, lignans, cou-marins, and many other active components.^{6,7} The mechanism of action of the substances are multi-facetted and often not yet extensively explored. The focus of the present review is particularly on Indian medicinal herbs and plants used to treat viral diseases,

Sl. No.	Common name	Local name	Botanical name	Family name	Parts use	Medicinal use(s)
1	Onion	Lehsan	<i>Allium sativa</i>	Liliacea	Bulb	Measles, poliomyelitis, herpes
2	Aloe vera	Kumari, Ghirita	<i>Aloebarbadensis</i>	Liliacea	Flowers	Influenza
3	Devil tree	Vishagni	<i>Alstonia venenata</i>	Apocyanaceae	Roots	Measles
4	Joseph's coat;	Bhaji	<i>Amaranthus tricolor</i>	Amaranthaceae	Leaf	Human tumors caused by viruses
5	Custerd apple	Sarifa	<i>Annona reticulata</i>	Annonaceae	Leaf	Influenza, Measeles
6	Andamanesee bowstring plant	Indian - Mallow	<i>Anodendron paniculatum</i>	Apocyanaceae	Leaf	Hepatitis
7	Margosa	Neem	<i>Azadirachta indica</i>	Meliaceae	Seed,leaf	Herpes, Measeles, chicken pox
8	Indian pennywort	Brahmi	<i>Bacopa monnieri</i>	Scrophulariaceae	Leaf,seed	Herpes, HIV
9	Butterfly tree	Kaniar	<i>Bauhinia purpurea</i>	Caeselpiniaceae	Leaf,Aerial part	Herpes
10	Asiatic penn-ywort, gotukola	Jal Brahmi,	<i>Centella asiatica</i>	Apiaceae	Root	Herpes, influenza
11	Nettle-leaved goosefoot	Bathua	<i>Chenopodium murale</i>	Chenopodiaceae	Whole plant	Herpes, Hepatitis
12	Henna plant	Mehendi	<i>Lawsonia inermis</i>	Lythraceae	Leaf	Poliomyelitis, Measles
13	Ginger	Adrak	<i>Zinger officinale</i>	Zingiberaceae	Rhizome	Poliomyelitis, Measles
14	Mango	Aam	<i>Magnifera indica</i>	Anacardaceae	Stem bark	Jaundice
15	Bamboo	Bash	<i>Banbusa vulgaris</i>	Poaceae	Leaf	Measles
16	Bitterguard	Karela	<i>Momordica charantia</i>	Curbitaceae	Whole plant	Jaundice, Yellow fever
17	Maize	Makai	<i>Zea mays</i>	Poaceae	Flower	Chickenpox
18	Tobacco	Tambaku	<i>Nicotiana tabacum</i>	Solanaceae	Leaf	Poliomyelitis
19	Heliotrope	Siriyari	<i>Helitropium indiucom</i>	Boraginuaceae	Leaf	Measles
20	Guava	Amrud	<i>Psidium guajava</i>	Myrtaceae	Stem bark	Jaundice
21	Korina, frake	Limba	<i>Terminalia superb</i>	Cobretaceae	Stem bark	Yellow fever

which are cheap and easily accessible since viral infections can be one of the biggest nightmares for Medical Practitioners and patients.

List of Some Selected Medicinal Herbs under screening for Anti-viral properties based on Traditional Knowledge Documentation.^{8,9,10,11}

CONCLUSION

Nature developed a variety of antiviral agents during the evolution of plants. Due to the global disease burden caused by viral infections now a days and in the past, there is an urgent need to identify novel compounds with antiviral activity. Medicinal herbs might contribute to an improvement of public health especially in developing countries, since the majority of the population has not the economic power to account for expensive antiviral drugs. A condition to realize the concept of evidence-based phytotherapy is to explore the scientific basis of bioactive medicinal plants. Placebo-controlled, double-blind clinical trials have to be performed to provide unambiguous evidence for the therapeutic value of medicinal plants. In addition to efficacy, the safety of phytotherapeutic approaches has to be demonstrated.

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